Test Method: Flammable Plastics

DOCUMENT IDENTIFIER: A-SP-ELCE059-TM-002N Rev C, 26-Oct-1992

ABSTRACT: This test method describes procedures to be followed to verify that plastic parts meet flammability performance and traceability requirements.

APPLICABILITY: Test methods and verification procedures apply to both electrical and non electrical plastic parts.

STATUS: APPROVED 26-Oct-1992; use VTX SMC for current status.

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1 PURPOSE

This document describes the procedures that must be followed to verify that purchased plastic components, non electrical and electrical, meet the flammability performance and traceability criteria contained in *DEC STD 119-1 Digital Product Safety - Design Criteria*, and that they comply with applicable Underwriters Laboratories (UL) and Canadian Standards Association (CSA) requirements.

2 VERIFICATION PROCEDURE FOR NON ELECTRICAL COMPONENTS

The verification procedure will vary depending upon the requirements for the specific part. The verification may range from a check to see that the part is UL recognized to an actual flame test of the part. The documentation (purchase specification or drawing) should specify flammability requirements.

2.1 UL RECOGNIZED MOLDER AND UL RECOGNIZED PLASTIC

This requirement indicates that the plastic part must:

1. Be made by a molder recognized by Underwriters Laboratories (as evidenced by having a UL recognized component file and guide number).
2. Be made from UL recognized plastic.

The verification procedure is:

a. Identify and determine the UL 94 flammability rating requirement and the recognized molder marking requirements.

b. Determine, from the qualified vendor list (QVL), the UL molder identification code.

c. Verify that the molder's name or trademark and the identification code are marked on:
   - The molded part
   - The carton in which the molded parts are shipped
   - The specification sheet or packing slip placed in the carton

d. Verify that the following is marked on the carton, on the specification sheet, or the packing slip, and that it agrees with the purchase specification:
   - Part identification, for example, part number
   - Date of molding
   - Material identity, for example, material, resin manufacturer's name, and material/resin designation

e. Determine whether it has been 12 months (one year) or more since the part was flame tested.

   If it has not been 12 months (one year) or more since the part was flame tested, and steps a through d were successful, consider the verification complete.

   If it has been 12 months (one year) or more since the part was flame tested. This testing is necessary to comply with CSA requirements. For small parts, see subhead 2.4 to determine if flame testing can be waivered.

Exceptions in accordance with subhead 2.1.

These are the only exceptions on a part.

1. Vendor changes
2. Material changes

2.2 NON RECOGNIZED MOLDER/UL RECOGNIZED PLASTIC

This requirement indicates that the plastic part is made from UL recognized material or resin by a molder who is not UL recognized. The verification procedure is:

a. From the purchase specification determine the material or resin identity and UL 94 rating.

b. Verify that the vendor supplies, with each lot, a Certificate of Compliance (see Appendix D) or a signed statement on or attached to the packing slip stating that the part is made from the exact material specified on our purchase specification, and the date of molding.

c. Determine whether it has been 12 months (one year) or more since the part was last flame tested.

   If it has not been 12 months (one year) or more since the part was last flame tested, and steps a and b were successful, consider the verification complete.

   If it has been 12 months (one year) or more since the part was last flame tested. This testing is necessary in order to comply with CSA requirements. For small parts, see subhead 2.4 to determine if flame testing can be waivered.

2.3 NON RECOGNIZED MOLDER AND NON RECOGNIZED PLASTIC

This requirement indicates that neither the molder nor the material or resin are UL recognized. However, the plastic part must meet a minimum UL 94 flammability rating. The verification procedure is:

1. From the purchase specification determine what the flammability rating must be.
2. Perform flame testing per the applicable flame test method.

2.4 SMALL PLASTIC PARTS

Small parts having a Certificate of Compliance (see Appendix D) need not be subjected to verification by flame testing. A small part is defined as:

1. One that does not occupy a volume greater than 2 cubic centimeters (0.122 cubic inch)
2. One that does not have any dimension greater than 3 centimeters (1.18 inch)

The volume can be determined by calculation or test. A simple GO/NO-GO test, (where the part does not displace more than 2 ml of water in a graduated cylinder) could be used.

2.5 ELECTRICAL COMPONENTS

This verification procedure will vary depending upon the requirements of the component. The verification may range from a check to see that the component is UL recognized or listed and CSA certified to an actual flame test of the component.

a. Determine if the purchase specification requires UL recognition or listing and CSA certification for the component.

b. Determine, from the QVL, that the component is UL recognized or listed and CSA certified.

c. If the component does not require UL and CSA approval in step 1 and 2, see subhead 2.1 to determine if flame testing is required.

d. If the component requires UL and CSA approvals, verify UL and CSA approvals at least once every 12 months (one year) using either UL and CSA markings on the components, or by checking vendor name and part number in the CSA and UL directories (see Appendix A).

If step d is successful, no flame testing is required.

If step d is unsuccessful, consult your plant product safety coordinator for resolution.

2.6 UL AND CSA TEST REQUIREMENT SUMMARY

A summary of the UL and CSA test requirements appears in Table 1.

Table 1: Summary of UL and CSA Test Requirements

Description	Examples	UL Test Requirements*	CSA Test Requirements*
Electrical parts	Switches, relays, circuit breakers, connectors, terminal blocks, receptacles, and so on.	1 or 3	2 or 4
External enclosures or parts there of	Video terminal housing, plastic terminal block covers in operator access areas, bezels serving as part of external housing, and so on.	1 or 3	4
Miscellaneous non electrical components	Sound deadening foam, cable separating foam, sheet and bar stock, card guides and handles, filter foam not specified per UL 900, and so on.	1 or 3	4
Air filter assemblies	Class I or II "air filter units" specified per UL 900	1 or 3	1 or 4 (if not UL recognized).
Air moving devices	Fans and blowers	2-If entire fan, including blades and housing is UL recognized.	2-If entire fan, including blades and housing are UL recognized or CSA certified.
		1 or 3 - For housing and blades if motor only is UL recognized.	4 - For blades and housing if motor only is UL recognized or CSA certified.
Exceptions	ICs, transistors, transformers, resistors, capacitors, and so on.	5	5

* Definition of the numerical codes appearing in the UL and CSA test requirement columns are:

1. None if component is UL listed or recognized.

   UL recognition can be found in the UL recognized component directory. This directory is a listing containing UL recognized plastics that is updated annually.
2. None, if component is CSA certified.
3. Samples tested from each lot if material cannot be verified as UL recognized.
4. Sample must be tested every 12 months (one year) if material is not being tested per lot. Samples do not require preconditioning for CSA tests.
5. None. These components are not CSA certified or UL listed or recognized and do not have any flammability requirements.

3 TEST APPARATUS

The test methods described in this document require the use of the equipment and materials listed in Table 2, or their equivalent.

Table 2: List of Test Equipment and Materials

Quantity	Description	Manufacturer or Distributor	Part Number
1	Flammability test chamber	DEC	93-06924-0-0
1	Desiccator cabinet	C.M.S.	076-190
2	Rectangular base supports	C.M.S.	220-129
2	Small utility clamps	C.M.S.	058-909
2	Large utility clamps	C.M.S.	058-941
1	Stopwatch, 60 s dial	C.M.S.	219-519
1	Stopwatch holder	C.M.S.	219-592
1 carton	Absorbent surgical cotton	C.M.S.	438-339
2	Thermometer clamps	C.M.S.	072-348
1	Tirrill type burner	C.M.S.	043-208
1 pkg.	Burner wing tops	C.M.S.	043-356
1	Two-stage gas pressure regulator for use with methane gas	C.M.S.	162-545
	Gas supply—technical grade methane or natural gas having a heat content of approximately 1000 BTU per cubic foot (37 MJ per cubic meter).		
	Supply of hardware cloth - 4 mesh, 20 gauge		
	Supply of iron wire gauze - 20 mesh, 24 gauge		

C.M.S.

Curtin Matheson Scientific
110A Commerce Way, Bldg. 1
Woburn, MA

4 GENERAL PROCEDURE

This general procedure provides flame test methods for performing all normal UL 94 tests. These tests will be performed by the nearest flame test centers as given in item d of head 5. The appropriate samples, as determined by the specific UL 94 test procedure, shall be sent to this flame test center along with the test report form as described in item c of head 5. A flammability test setup summary is presented in Appendix B. Refer to *A-SP-EL00119-TM-0D14, Test Method For Flammability*.

4.1 SAFETY PRECAUTIONS

The following safety precautions must be observed in performing flame tests.

a. **Ventilation** - Toxic gases may be released from materials undergoing test. The flame hood must provide a positive means of exhausting these gases. The proper operation of this exhaust must be assured before doing these tests.

b. **Personnel Protection** - The test operator and any person witnessing tests must protect their exposed skin, eyes, and clothes from any hot splattering materials. Safety glasses, gloves, and a flame retardant lab coat are suitable for this purpose.

c. **Facilities** - A fire extinguisher (preferably a CO_2 or dry chemical type) shall be available in the immediate area.

4.2 TEST DATA

Test data shall be recorded and retained as described under head 5.

4.3 HORIZONTAL BURNING TEST FOR CLASSIFYING MATERIALS 94HB

Listed are the required specimen sizes for a horizontal burning test.

a. Tested specimens should be limited to a maximum thickness of 12.70mm (0.500 inch).

b. Specimen should be 127.0mm (5.0 inches) in length by 12.70mm (0.50 inch) in width, in the maximum thickness of 12.70mm (0.500 inch), and in the 3.17mm (0.125 inch) thickness.

c. Edges are to be smooth and the radius on the corners is not to exceed 1.27mm (0.05 inch).

d. If actual parts are too small to be cut to the above dimensions, use the actual parts for testing.

4.4 SPECIMEN CONDITIONING (NOT REQUIRED FOR CSA TESTS)

Sets of three specimens each are to be conditioned for at least 48 hours at 23 C ± 2° and at a relative humidity of 50 ± 5% prior to testing.

Sets of five specimens each are to be conditioned in a circulating air oven for a duration of 168 hours at 70 C ± 1°, and then cooled in a desiccator over anhydrous calcium chloride for at least four hours at room temperature prior to testing.

4.5 TEST METHOD

Here is a list of horizontal burning tests for classifying materials 94HB.

a. The burning test is to be conducted in a draft free chamber with an exhaust fan for removing the after products of the test.

b. Each specimen is to be marked across its width with two lines, 25.40mm (1.0 inch) and 101.60mm (4.0 inches) from one end.

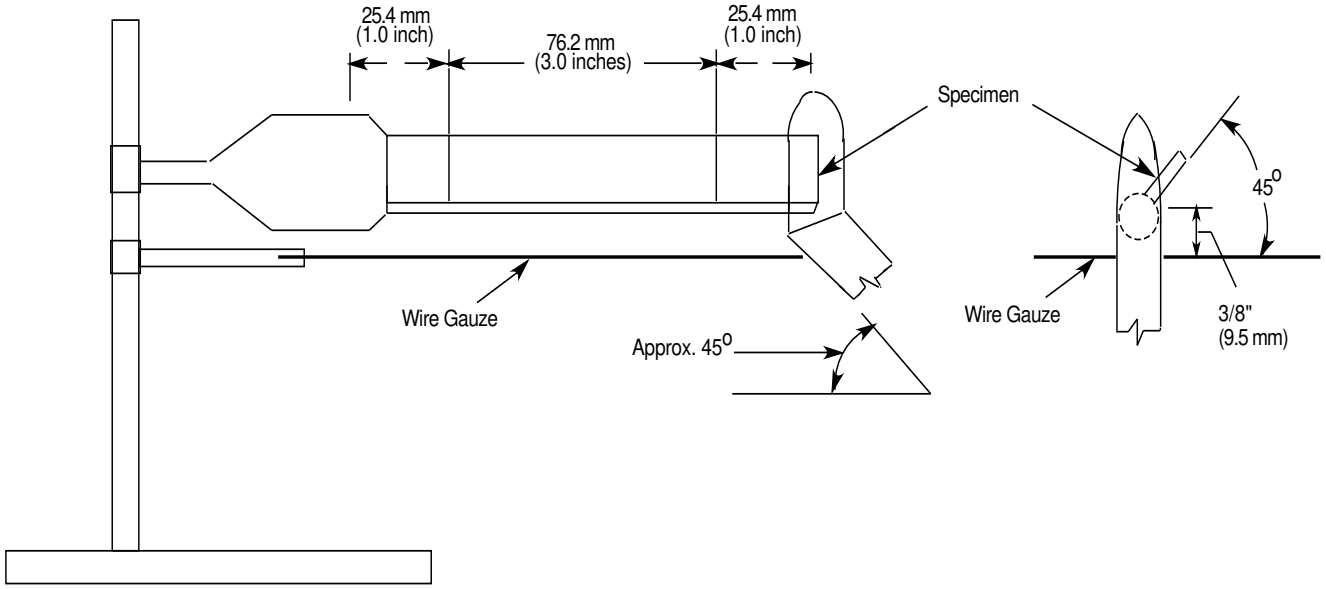
c. Clamp specimen at farthest end from the 1-inch mark, with its longitudinal axis horizontal and its transverse axis inclined 45 degrees. Clamp wire gauze 3/8 inch below the lowest edge of the specimen, and with the free end of the specimen even with the end of the wire gauze. See Figure 1.

d. Place burner remote from specimen, light, and adjust to produce a 25.40mm (1-inch) blue flame. The flame is to be applied to the free end, at the lower edge of the specimen. See Figure 1.

e. The flame is to be applied to a depth of approximately 6.35mm for 30 seconds, without changing the burner position, and then the flame is removed. If the specimen burns to the 6.35mm (1-inch) mark before 30 seconds have expired, the flame application is to be discontinued.

f. If the specimen continues to burn after removal of the flame, the time for the flame front to travel from the 25.40mm (1-inch) mark to the 101.60mm (4-inch) mark is to be determined and the rate of burn calculated.

Figure 1: Setup For Horizontal Burning Test



4.6 MATERIAL CLASSIFICATION

Materials tested in accordance with this procedure shall be classified 94HB, if they:

a. Do not have a burning rate that exceeds 1.5 inch per minute over a 76.20mm (3-inch) span, for materials 3.05mm (0.120) through 12.70mm (0.500 inch) thick.

b. Do not have a burning rate that exceeds 76.20mm (3.0 inches) per minute over a 76.20mm (3-inch) span for materials less than 3.05mm (0.120 inch) thick.

c. Cease to burn before the flame reaches the 101.60mm (4-inch) reference mark.

5 VERTICAL BURN TEST FOR CLASSIFYING MATERIALS 94V-0, 94V-1, AND 94V-2

Listed are the required specimens for vertical burning.

a. Specimens should be 127.00mm (5.0 inches) in length by 12.70mm (0.50 inch) in width with a maximum thickness of 12.70mm (0.50 inch).

b. The edges are to be smooth and the radius on the corners are not to exceed 12.70mm (0.50 inch).

c. If actual parts are too small to be cut to the above dimensions, use the actual parts for testing.

5.1 SPECIMEN CONDITIONING (NOT REQUIRED FOR CSA TESTS)

Sets of five specimens each are to be conditioned for at least 48 hours at a temperature of 23 C ± 2°, and a relative humidity of 50 ± 5% prior to testing.

Sets of five specimens each are to be conditioned in a circulating air oven for a duration of 168 hours at 70 C ± 1°, and then cooled in a desiccator over anhydrous calcium chloride for at least 4 hours at room temperature prior to testing.

5.2 TEST METHOD

Here is a list of vertical burning tests for classifying materials 94V-0, 94V-1, and 94V-2.

a. The burn test is to be conducted in a draft free chamber with an exhaust fan for removing after products of the test.

b. Each specimen is to be supported from the upper 6.35mm of the specimen, with the longitudinal axis vertical, and the lower end of the specimen 9.52mm (3/8 inch) above the burner and 304.80mm (12 inches) above the horizontal layer of dry absorbent cotton swatch, thinned to 6.35mm .

c. Place burner remote from specimen, light, and adjust burner to produce a 19.05mm (3/4-inch) solid blue flame.

d. The flame is then placed centrally under the lower end of the test specimen and allowed to remain 10 seconds. The flame is then withdrawn at least 152.40mm (6 inches) and the duration of flaming of the specimen noted. The test flame is immediately placed again under the specimen and allowed to remain 10 seconds. The test flame is removed after 10 seconds and the duration of flaming and glowing is to be noted.

5.3 MATERIAL CLASSIFICATION

Materials tested in accordance with this procedure shall be classified 94V-0, if they:

a. Do not have any specimens that burn with flaming combustion for more than 10 seconds after either application of the test flame.

b. Do not have a total flaming combustion time that exceeds 250 seconds for the 10 flame applications for each set of five specimens tested.

c. Do not have any specimens that burn with flaming or glowing combustion up to the holding clamp.

d. Do not have any specimens that drip flaming particles that ignite the layer of dry absorbent cotton.

e. Do not have any specimens with glowing combustion that persists beyond 30 seconds after the second removal of the test flame.

5.4 MATERIAL CLASSIFICATION

Materials tested in accordance with this procedure shall be classified 94V-1, if they:

a. Do not have specimens that burn with flaming combustion for more than 30 seconds after either application of the test flame.

b. Do not have a total flaming combustion time that exceeds 250 seconds for the 10 flame applications for each set of five specimens tested.

c. Do not have any specimens that burn with flaming or glowing combustion up to the holding clamp.

d. Do not have any specimens that drip flaming particles that ignite the layer of dry absorbent surgical cotton 304.80mm (12 inches) below the specimen.

e. Do not have any specimens with glowing combustion that persists beyond 60 seconds after second removal of test flame.

5.5 MATERIAL CLASSIFICATION

Materials tested in accordance with this procedure shall be classified 94V-2, if they:

a. Do not have any specimens that burn with flaming combustion for more than 30 seconds after either application of the test flame.

b. Do not have a total flaming combustion time exceeding 250 seconds for the 10 flame applications for each set of five specimens tested.

c. Do not have any specimens that burn with flaming or glowing combustion up to the holding clamp.

d. Have specimens that drip flaming particles that burn only briefly, some of which may ignite the dry absorbent surgical cotton located 304.80mm (12 inches) below the test specimen.

e. Do not have any specimens with glowing combustion that persists beyond 60 seconds after the second removal of the test flame.

6 HORIZONTAL BURN TEST FOR CLASSIFYING FOAMED MATERIALS 94HBF AND 94HF-1

Listed are the required specimens for horizontal burning test.

a. Specimens 152.40mm (6.0 inches) in length by 50.80mm (2.0 inches) in width having a maximum thickness of 12.70mm (0.50 inch) are to be used.

b. The edges are to be smooth and the radius on the corners is not to exceed 1.27mm (0.05 inch).

c. Any loose particles are to be removed from the surfaces of the specimens.

d. If actual parts are too small to be cut to the above dimensions, use the actual parts for testing.

6.1 SPECIMEN CONDITIONING (NOT REQUIRED FOR CSA TESTS)

Sets of five specimens each shall be conditioned for at least 48 hours at a temperature of 23 C ± 2° and a relative humidity of 50 ± 5% prior to testing.

Sets of five specimens each are to be conditioned in a circulating air oven for a duration of 168 hours at a temperature of 70 C ± 1° and then cooled in a desiccator over anhydrous calcium chloride for at least four hours at room temperature prior to testing.

6.2 TEST METHOD

Here is a list of horizontal burning tests for classifying foamed materials 94HBF and 94HF-1.

a. The burn test is to be conducted in a draft free chamber with an exhaust fan for removing after products of the test.

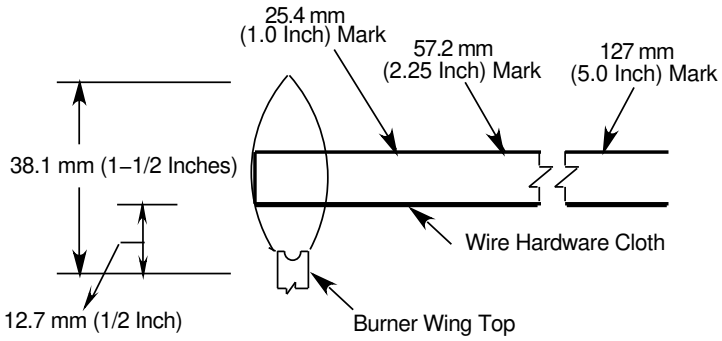
b. The formed steel hardware cloth is to be held by clamps so that the 152.40mm (6.0 inches) by 50.80mm (2.0 inches) piece is horizontal, 12.70mm above the top of the burner wing tip, and 304.80mm (12 inches) above a horizontal layer of dry absorbent surgical cotton, 76.20mm (3) by 76.20mm (3 inches) square, having a thickness of 6.35mm . The cotton is to be located under the front portion of the steel hardware cloth having the up turned end.

c. Each specimen is to be marked across its width with three lines; 25.40mm (1.0 inch), 57.15mm (2.25-inches) and 127.00mm (5.0 inches) from one end. The specimen is to be placed flat on the hardware cloth. The front end of the horizontal specimen, the end closest to the 57.15mm (2.25-inch) mark, is to be placed in contact with the upturned end of the hardware cloth.

d. The burner, with wing tip, is then placed remote from specimen, ignited, and adjusted to provide a 38.10mm (1 ½-inch) solid blue flame. The burner is then quickly placed under the specimen so that one edge of the flame is in line with the upturned end of the hardware cloth, and the other end of the flame extends into the front of the specimen. See Figure 2.

e. The flame is to be applied for 60 seconds and then removed from the specimen. If specimen continues to burn after removal of the test flame, the time for the flame to travel from the 25.40mm (1 inch) mark to the 127.00mm (5-inch) mark is to be determined and the rate of burning calculated. If the specimen ceases to burn before the 127.00mm (5-inch) mark is reached, the duration of burning after removal of the test flame and the distance of burning from the end exposed to the test flame are to be recorded.

Figure 2: Setup for Horizontal Burn Test, Foamed Materials



6.3 MATERIAL CLASSIFICATION

Materials tested in accordance with this procedure shall be classified 94HBF, if they:

a. Do not have any specimen with a burning rate exceeding 38.10mm (1.5 inches) per minute over a 101.60mm (4.0-inch) span.

b. Have each specimen, from set of five specimens tested, cease to burn before the flames reaches the 127.00mm (5.0-inch) reference mark.

6.4 MATERIAL CLASSIFICATION

Materials tested in accordance with this procedure shall be classified 94HF-1, if materials tested:

a. Do not have any portion of 4 out of 5 specimens tested that continue to flame for more than 2 seconds after removal of test flame.

b. Do not have any portion, of any test specimen, that continues to flame for more than 10 seconds after removal of test flame.

c. Do not have any specimen affected for a distance greater than 57.15mm (2.25 inches) from the end exposed to the test flame.

d. Do not have any specimens that drip flaming particles which ignite the dry absorbent surgical cotton located 304.80mm (12 inches) below the test specimen.

e. Do not have any specimens with glowing combustion which:

   1. Persists beyond 30 seconds after removal of test flame.

   2. Travels past the 57.15mm (2.25-inch) mark.

7 VERTICAL BURN TEST FOR CLASSIFYING MATERIALS 94-5V

Listed are the required specimens for vertical burning tests.

a. Test specimens 127.00mm (5.0 inches) in length by 12.70mm (0.50 inch) in width and test plaques approximately 152.40mm (6 inches) by 152.40mm (6 inches) are to be tested, with a maximum thickness of 12.70mm (0.50 inch).

b. The edges are to be smooth and the radius on the corners is not to exceed 12.70mm (0.05 inch).

7.1 SPECIMEN AND PLAQUE CONDITIONING (NOT REQUIRED FOR CSA TESTS)

Each set of five is to be conditioned for at least 48 hours at a temperature of 23 C ± 2° and a relative humidity of 50 ± 5% prior to testing.

Each set of five is to be conditioned in a circulating air oven for 60 days at 121 C ± 1°, and then cooled in a desiccator over anhydrous calcium chloride for at least 4 hours at room temperature prior to testing.

7.2 TEST METHOD A: TEST OF SPECIMENS

Here is a list of vertical burning tests for 94-5V material specimens.

a. The burn test is to be conducted in a draft free chamber with an exhaust fan for removing after products of the test.

b. The test specimen is to be supported from the upper 6.35mm with its longitudinal axis vertical. The burner is to be mounted on a 20° block, with the narrow edge of the specimen facing the burner. See Figure 3.

c. The burner is to be placed remote from the specimen, ignited, and adjusted so the overall height of the flame is 127.00mm (5 inches) and the inner blue cone is 38.10mm (1 ½ inch). See Figure 3.

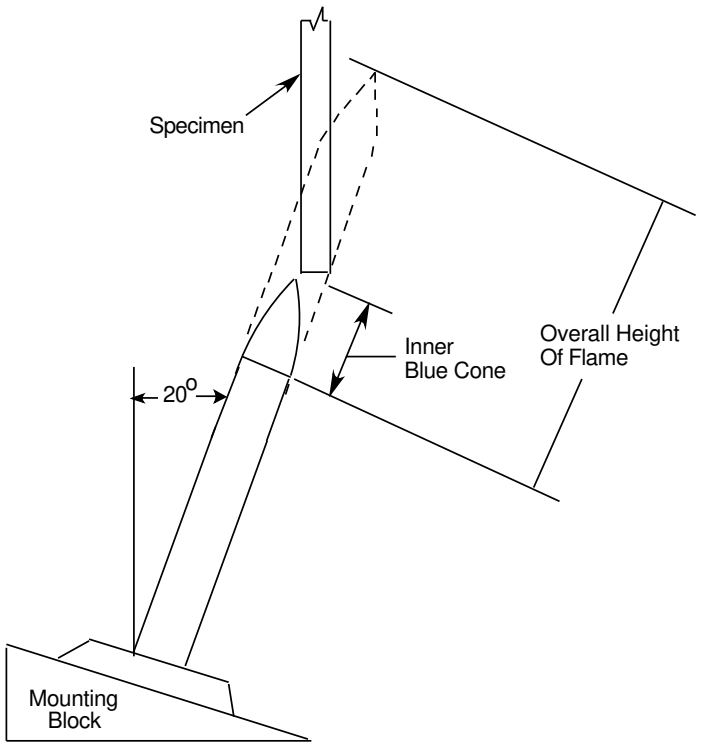
d. The flame is then applied to one of the lower corners of the specimen, at an angle of 20°, so the tip of the blue cone touches the specimen.

e. The flame is to be applied for five seconds and removed for five seconds. This is done for five applications of the test flame.

f. After the fifth removal of test flame, record:

   1. Duration of flaming plus glowing.
   2. The distance specimen was burned or affected.
   3. Whether specimen dripped particles during test.
   4. Observations of deformation and physical strength immediately after burning and when cooled.

Figure 3: Setup for Test Method A and B



7.3 TEST METHOD B: TEST OF PLAQUES

Here is a list of vertical burning tests for 94-5V material plaques.

a. The burn test is to be conducted in a draft free test chamber with an exhaust fan for removing after products of test.

b. Plaques are to be tested in various positions so the test flame is applied as follows:

   1. Plaque vertical with flame applied to lower corner of plaque.
   2. Plaque vertical with the flame applied to lower edge of plaque.
   3. Plaque vertical with flame applied to center of one side of plaque.
   4. Plaque horizontal with flame applied to the center of bottom surface of plaque.
   5. Plaque horizontal with flame directed downward to top surface of plaque.

c. The burner is to be placed remote from specimen, ignited, and adjusted so that overall height of flame is five inches and the height of inner blue cone is 38.10mm (1 ½ inches) high. See Figure 3.

d. The flame is then placed so the tip of the blue cone touches the test plaque in each of the positions described in b. above.

e. The flame is then applied for five seconds, and then removed for five seconds. This operation is to be done five times.

f. After the fifth removal of test flame, the following are to be recorded:

   1. Duration of flaming plus glowing.
   2. Distance the plaque burned or was affected.
   3. Whether or not particles dripped from plaque
   4. Observations of deformation and physical strength immediately after burning and when cooled.

7.4 MATERIAL CLASSIFICATION

Materials tested in accordance with this procedure shall be classified 94-5V if they:

a. Do not have any specimens or plaques that burn with flaming or glowing combustion for more than 60 seconds after the 5th removal application of test flame.

b. Do not have any specimens or plaques that drip any particles.

c. Do not have any specimens or plaques that are destroyed to a significant degree in the area of the test flame.

8 PASS OR FAIL CRITERIA AND RECORD KEEPING

Parts that pass the applicable verification procedure may be considered acceptable. A flammability pass/fail criteria summary is presented in Appendix C.

Refer to the sample Flammability Test Report form shown in Figure 4.

Figure 4: Flammability Test Report Form

digital

FLAMMABILITY TEST REPORT

Part Number (1)	Rev. (2)	Part Name (3)	Plant (4)	Control No. (5)

Vendor (Part) (6)	Lot Size (7)	Date Insp. (8)	Inspector (9)

Manufacturer (Material) (10)	Material Thickness (11)	P.O. No. (12)	Product Line (13)	C. of C. Required (14) ☐ Yes ☐ No

Material Description (Trade Name) (15)	Color (16)	Flame Test Reqm't (17)	Telephone (DTN) (18)

MATERIAL TESTED FOR FLAMMABILITY CLASSIFICATION

HORIZONTAL TEST	VERTICAL TEST		Flame Test Method (19)
Average Burn Time	Average Burn Time (22)		Specimen Size (20)
Range of Burn Time	Range of Burn Time (23)		Flame Test Result (21)
Specimen Drip	Specimen Drip (24)	Ignites Cotton (25)	☐ ACCEPTED ☐ REJECTED

Comment

Corrective Action Recommended

➤ FINAL ACCEPTANCE OF THE MATERIAL TESTED DEPENDS ON USE AND LOCATION IN COMPLETED EQUIPMENT ◄

Tested By ➤	Location	Phone	Date Tested

When the procedure includes performance of a flame test, the form shown in Figure 4 shall be used to record the data per the following.

a. To be filled in by Incoming Inspection:

1. **Part Number** Example: 48-40008-1.
2. **Rev** is part revision noted on P.O. Example: blank.
3. **Part Name** from purchase specification or drawing. Example: sheet stock.
4. **Plant** is 3-digit plant location code. Example: MLO.
5. **Control No.** is the Transfer and Flow Form (TFF) number, Cintron number, N.C.M.R. number, or other plant unique control number. Example: 12345.
6. **Vendor** is the molder or supplier of the finished part to the Digital facility. Example: Commercial Plastics.
7. **Lot Size** is the actual number of pieces received in this shipment or covered by this flame test report. Example: 30 sheets.
8. **Date Inspection** is the actual date that the inspection started for this lot. Example: 08 - Jan - 1978.

9. **Inspector** is the incoming inspector requesting the flame test report. Example: #22 Joan Smith.
10. **Manufacturer** is the raw (resin) material manufacturer. Example: General Electric.
11. **Material Thickness** is the actual thickness of the part or sample being tested. Example: 3.17mm (0.125 inch).
12. **P.O. Number** is the plant purchase order number. Example: M493147.
13. **Product Line** is the line(s) the end item is used on. Example: VAX 11/780.
14. **C of C** Required
15. **Trade Name and Designation**

    Trade Name: the manufacturers unique trade name, such as Lexan, do not use the generic name.

    Designation: the type or letter or code identifier. Example: 9034.
16. **Color** is the color of the plastic part. Example: clear #112.
17. **Flame Test Requirement** is the requirement as stated on the purchase specification or drawing. Example: 94V-2.
18. **Telephone** is the phone number of the requesting plant incoming inspection area. Example: DTN: 223-2337.

b. To be filled in at the Flame Test Lab

19. **Flame Test Method** — rating that piece was tested for. Example: 94V-2.
20. **Specimen Size:** — the actual part size or test piece size.
21. **Flame Test Results** — the actual rating of the item being tested.
22. **Average Burn Time** — Sample 2/10S (two 10-second burns).
23. **Range of Burn Time:** — Sample: Under 30 seconds.
24. **Specimen Drip** Yes or No.
25. **Ignites Cotton** Yes or No.

c. Procedure:

1. Items 1 through 16 would be filled in by the requesting incoming inspector, clerk, or other user.
2. Record Serial Number, Part Number and Control Number in department flame test log and history card as applicable.
3. Detach the #4 copy (material) and file in Incoming Inspection Department, either with the material, history file or tickler file, and forward the three remaining copies, along with the actual sample, to the regional flame test lab for processing.
4. The regional flame test lab will complete the bottom half of the form, remove and file the #1 copy, and return the #2 and #3 copies to the requesting Incoming Inspection Department or other user.
5. If acceptable, the return is noted in the requesting Incoming Inspection Department flame test log and the #1 copy is filed in the part history file. The #3 copy may be destroyed.

6. If rejected, the return and disposition is noted in the requesting Incoming Inspection Department flame test log and the #1 copy is filed in the part history file. The #3 copy is stapled to the N.C.M.R for disposition of the reject. Final disposition should then also be recorded on the #1 copy.
7. Flame test reports should be filed in the Incoming Inspection Department for two years. Flame test center records shall be maintained indefinitely. A copy of each flame test report also shall be forwarded to the Materials Research Laboratory for central record retention. These records shall be retained indefinitely.

d. Flame Test Centers:

1. Northeast:

   MLO5-1/P55, DTN: 223-3058
   Materials Research Laboratory and Central Record Location

2. Southwest:

   Colorado Incoming Inspection
   CXO, DTN:522-3497

3. For Digital's European Facilities; Galway, Ireland
4. For Digital's Far Eastern Facilities:

   Hong Kong

   Taiwan

   Singapore

APPENDIX A UL RECOGNIZED COMPONENTS (YELLOW BOOK) AND CSA DIRECTORIES

1. (Recognized) UL Recognized Component Directory (Yellow Book)

   Copies may be obtained from:

   Underwriters Laboratories
   Publications Stock
   333 Pfingsten Road
   Northbrook, IL 60062
   Telephone: (312) 272-8800, Ext. 2612 or 2622

2. List of Certified Equipment

   Copies may be obtained from:

   Canadian Standards Association
   Standards Sales
   178 Rexdale Boulevard
   Rexdale, Ontario Canada M9W1R3
   Telephone: (416) 744-4044

APPENDIX B FLAMMABILITY TEST SETUP SUMMARY

	Flammability Test Class				
Test	94V-0,1,2	94HF-1, HBF	94HB	94-5V Method A	94-5V Method B
Sample Size in Inches (Length, Width, thickness)	5.0, 0.5, 0.5 maximum	6.0, 2.0, 0.5 maximum	5.0, 0.5, 0.5 maximum	5.0, 0.5, 0.5 maximum	6.0, 6.0 0.5 maximum
No. of Samples	10 (UL), 5 (CSA)	10 (UL), 5 (CSA)	3 (UL) & 5 (CSA)	10 (UL), 5 (CSA)	10 (UL), 5 (CSA)
Sample Position	Vertical	Horizontal	Tilted 45° on Horizontal Axis	Vertical	V & H
Flame Size	0.75 inch blue flame	1.5 inch blue flame	1.0 inch blue flame	5 inch outer cone with a 1.5 inch inner blue cone	
Burner Base Angle	0° (45° if particles drip into barrel)	0°	45°	20°	20°
Flame On Time	10 s	60 s	30 s	5 s	5 s
Flame Off Time	Until combustion stops	N/A	N/A	5 s	5 s
No. of Applications	2	1	1	5	5

APPENDIX C FLAMMABILITY RATING PASS/FAIL CRITERIA SUMMARY

Table 3: 94V-0, 1, AND 2 TESTS

Test	Criteria		
	94V-0	94V-1	94V-2
Maximum flaming time	10 s	30 s	30 s
Maximum flaming and glowing time	30 s	60 s	60 s
Total maximum flaming time for 10 applications	50 s	250 s	250 s
Specimen burned to holding clamp	no	no	no
Dripping particles ignited cotton	no	no	Same may ignite cotton

Table 4: 94HF-1 AND 94-5V TESTS

	Criteria	
Test	94HF-1	94-5V
Maximum flaming time (4 of 5 specimens)	2 s	60 s
Maximum flaming time (any of 5 specimens)	10 s	60 s
Maximum flaming and glowing time	30 s	60 s
Maximum distance affected	2.25 in.	N/A
Dripping particles	yes or no	no
Cotton ignited	no	no
Significant degradation	N/A	no

APPENDIX D CERTIFICATE OF COMPLIANCE

The following illustration is an example of *Certificate of Compliance* form EN-01983-03-N178 332. Forms may be ordered from Forms Administration, NRO2.

Figure 5: Certificate of Compliance

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CERTIFICATE OF COMPLIANCE
(Non–Metallic Material)

Part Name	P/N Rev.
Material Name (Generic)	P.O. No.
Resin Mfg.	Date
Material Trade Name	Quantity
Type Color	Balance
Batch No.	Vendor's Name
Lot No.	Vendor Lot I.D. No.
U.L. Class No.	THIS SECTION FOR DIGITAL USE ONLY
	Accept Initial
U.L. Guide No.	Reject Initial
U.L. File No.	Date Q.C. Audit Date
Vendor's Q.C. Signature – Materials meet all applicable specifications	Date

EN–01983–03–N178 332

As a minimum, the unshaded blocks in the *Certificate of Compliance* form must filled out.

Exceptions to the certification of compliance

When the manufacturers have proprietary information that they do not wish to give out, and the *Certificate of Compliance* has been received, the form does not have to be filled out.

APPENDIX E REFERENCED DOCUMENTS

E.1 Digital Documents, EL-Class

EL-Class Number	Document Title
EL-00119-01	*DEC STD 119-1 Digital Product Safety — Design Criteria*
EL-00119-TM	*Test Method for Flammability*

E.2 Documents External to Digital

Document Number	Document Title
-	*UL Recognized Component Directory (Yellow Book)*

E.3 Ordering Information

Use VTX SMC to order copies of EL-class Digital documents from Standards and Methods Control. Send distribution questions to JOKUR::SMC or call DTN: 234-4423.

Following are the sources for documents not available from Standards and Methods Control. Copies may also be available from your local Digital library.

- Canadian Standards Association
  Standards Sales
  178 Rexdale
  Ontario, Canada M9W1R3
  Telephone (416) 744-4044
- Underwriters Laboratories
  Publications Stock
  333 Pfingsten Road
  Northbrook, IL 60062
  Telephone (312) 272-8800, Ext. 2612 or 2622

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